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ORGANIZATIONAL STRESSES AND HEALTH

E. K. E. GUNDERSON

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REPORT 73-59

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Organizational Stresses and Health\*

E. K. Eric Gunderson\*\*

Navy Medical Neuropsychiatric Research Unit

and

S. B. Sells\*\*\*

Institute of Behavioral Research  
Texas Christian University

The Navy's continuing concern with optimal utilization of its manpower resources has taken on new urgency with the implementation of the All Volunteer Force. To those responsible for medical and psychological support this concern implies a challenge to increase the capability to cope with motivational problems, mental disorders, physical illnesses, and accidents which have been recognized for many years as a major drain on human resources in the military services. Medical research programs seek to reduce losses due to employee accidents and illnesses by identifying causes and implementing preventive or remedial measures. Causal factors related to health and morale problems in industry and the military are only partially understood. Certain specific environmental factors have been shown measurably to affect morbidity rates in the adult population and, therefore, constitute known occupational hazards (1). The relationships of demographic variables to illness rates have also been well documented in many populations.

A number of recent studies have linked various forms of life stress, particularly job stress, to specific psychosomatic diseases and psychiatric disorders (2). The role that stresses and strains on the job, that is, that

organizational stresses play in ill health is not well understood at this time, but it is suspected by a number of medical investigators that physical and psychological stresses on the job present definite health hazards for many persons.

Selection and training, the traditional areas of personnel research, are indispensable in both industrial and military organizations, but at the same time they do not in themselves provide techniques for dealing with other major perennial work force problems, such as recruitment, retention, job satisfaction, group morale, and efficiency of the organization as a whole. Increasing attention is being given to the organizational context in which the individual works in efforts to make full use of manpower resources at all levels. Organizational theory is still in its infancy, and behavioral science has not yet come to grips with the diverse problems of management. Administration remains more of an art than an integrated body of concepts and practices. Proponents of "organizational development" claim that their methods lead to constructive change and development, but these claims have not been thoroughly evaluated.

- Research on organizations is largely uncharted, and, probably because of the expense and the complexity of the methodological problems involved, only a few major exploratory studies have been initiated. Multivariate research methods provide useful new approaches to the analysis of the relative importance of individual characteristics, environmental conditions, and organizational factors in determining illness rates, job dissatisfaction, absenteeism, premature attrition, and other indices of manpower wastage. A recent series of Navy studies of demographic variables, environmental factors, and psychological stresses conducted aboard Navy combat vessels during



overseas deployments revealed consistent relationships between illness incidence and ships' operational activities, working conditions, demographic characteristics of crew members, and recent life stresses. These studies included three cruisers, two aircraft carriers, and one battleship (3). Similar studies were conducted with naval aviators during carrier combat operations, and again demographic, environmental, and life stress variables were shown to correlate with the onset of illnesses or injuries (4).

Multiple regression methods were utilized to determine the relative contribution of individual personnel characteristics and work environment (job stress) factors to the prediction of illness and job satisfaction. Individuals working in physically demanding and/or hazardous environments had relatively high illness rates, and, generally, men in blue-collar jobs (Ordnance, Deck, and Engineering/Hull) experienced more illnesses than those in white-collar or technical jobs. This finding is consistent with related results from morbidity studies in civilian industry.

One observation of special interest occurred in these early Navy studies. It was noted that overall illness rates varied considerably from ship to ship. In one study it was possible to evaluate statistically the relative contribution of specific organization (ship) to the prediction of illnesses among crew members. The results were impressive (5). By including specific ships as variables in the prediction equation, the variance accounted for by the multiple correlation with the illness criterion (based upon a combination of demographic and job-related variables) was almost doubled. Further analysis revealed that the specific ship variable had a greater effect on prediction of infectious diseases than on prediction of traumatic injuries.

Substantial differences in illness rates among ships could not be explained in terms of differences in operational schedules, crew composition, or illness reporting procedures, and it was hypothesized that a combination of environmental conditions (habitability) and organizational or social context variables, as well as interactions among these factors, are involved in the variations in morbidity rates aboard the ships studied. Further research was needed to determine possible sources of variation in illness rates among ships and other types of organizations; if conditions could be identified which were associated with high illness rates and poor morale, appropriate corrective or preventive measures might be devised.

Large variations have also been found in psychiatric illness rates and alcoholism rates not only between different types of ships (for example, destroyers vs. nuclear submarines) but also among ships of the same type (for example, aircraft carriers).

In earlier research, focused principally on problems of long-duration space flights, Sells had developed a social systems model which enumerated a list of social system components for taxonomic analysis (6). Major components of this model were included under the general headings of goals and objectives, philosophy and value systems, personnel composition, organization, technology, environment, and temporal factors. The present authors (7) have more recently extended these social system concepts and outlined methodologies applicable to behavioral research required for long-duration space missions. In view of the generality of these approaches, their broader relevance for comparative studies of other types of organizational units, such as ships, was appreciated, and the rationale of the present study was formulated. Based on these social system concepts and the back-

ground of epidemiological and shipboard research outlined above, proposals were prepared to carry out an intensive study of some of the determinants of illness rates and other forms of performance ineffectiveness in individuals and groups aboard naval ships and shore stations. A small sample of civilian organizations was included for comparative purposes. This three-year research program, primarily concerned with environmental and organizational characteristics that affect health and morale and jointly sponsored by the Bureau of Medicine and Surgery and the Office of Naval Research, is now in its second year.

A study of this scope requires diverse professional talents. Major contributors to the research program are Dr. Lawrence R. James, and Dr. Allan P. Jones of the Institute of Behavioral Research, Texas Christian University, Fort Worth, and Dr. Blair W. McDonald, formerly of the Navy Medical Neuropsychiatric Research Unit, San Diego, and presently with the General Motors Corporation, Detroit, Michigan.

The study involves three phases. The first phase, consisting of a pilot study which involved 13 Navy ships and 1,200 crew members, was concerned mainly with development, testing, and revision of research instruments. The second phase now in progress includes the major data collection from a larger sample of organizations, including shore stations and civilian organizations; 20 Navy ships and 6,000 crew members have participated in this part of the study. Questionnaires, interviews, on-site observations, and personnel and organizational records have been gathered by research teams aboard ships under operational conditions and at selected shore facilities. Approximately half of these units are scheduled for a second round of data collection after an interval of four to six months in order to provide



longitudinal data on major variables. The third phase of the project concerned with data analysis and interpretation will conclude with final reports, presenting findings and recommendations to the Bureau of Medicine and Surgery and other naval authorities.

The pilot study has been completed, and the project is now well into the second phase. Almost all initial data from ships, shore stations, and civilian organizations have now been collected and processing of this vast array of information has begun. A brief summary of the kinds of data included in the study is given below.

Physical Environmental Evaluations. Trained research staff made observations of light, noise, temperature, ventilation, space (crowding), cleanliness/orderliness, and privacy in berthing, messing, head, and recreational areas. In addition, photographs were taken of the same areas, and these were compared with standard sets of photographs representing objective habitability scales.

Habitability Questionnaire. These items were designed to obtain crew members' perceptions of the same habitability dimensions that were estimated by objective means, namely, lighting, temperature, ventilation, cleanliness, privacy, etc., in berthing, messing, work, leisure and recreation, and head areas.

Organizational Climate Questionnaire. This instrument includes questions intended to tap crew members' perceptions of their work and social environments in terms of job characteristics (role ambiguity, job pressure, growth opportunities), leadership (support, confidence and trust), work group factors (friendliness and warmth, cohesiveness, group pride), and organizational characteristics (communication up and down, identification with the



Navy, concern for individual).

Biographical Data. A number of items pertaining to personal and military background are included.

Job Motivation and Satisfaction. These items describe many attributes of the individual's job and how satisfied he is with them. A number of items indicate satisfaction with superiors and with the Navy generally. Other questions are concerned with the individual's personal needs and desires in the work situation and how much he identifies with his job.

Service Records and Ship's Records. Personnel data such as aptitude scores, service schools completed, performance marks, disciplinary actions, and reenlistment information are gathered on all subjects.

Sick Call Checklist. All visits to the dispensary are recorded on cards containing identifying information, type of illness, and disposition. These cards are accumulated and provide illness criterion information for individuals, work groups, and ships.

Officer Questionnaires and Interviews. Department Heads and Division Officers are asked a number of questions pertaining to habitability, working conditions, organizational goals and procedures, formalization and centralization of authority, interdependence of organizational subunits, and adequacy of medical care.

The data described above will be used to develop taxonomies of individuals, situations, ships (organizations), and individual and group behavior outcomes. Such taxonomies will facilitate analysis of the interrelationships of individual characteristics (abilities, attitudes), environmental and organizational (habitability, climate) variables, and health and organizational effectiveness.

A general model of organizational behavior and effectiveness has been developed as a means of ordering the large number of variables at the individual, work group, and organizational levels in order to evaluate the mediating influences that are presumed to determine behavioral and organizational outcomes (8). The model proposes that behavior in organizations is a function of individual characteristics (such as abilities, motivations, training and experience) and situational variables (such as physical environment, organizational context, organizational climate). Some elements of this model which are relevant to individual and organizational performance are presented in Figure 1. The model views individual behaviors and attitudes, for example, job satisfaction, as a joint function of a subset of individual characteristics and a subset of variables representing the organizational situation. The research is seeking to determine, by various multivariate analysis techniques, the extent to which organizational climate can be predicted by variables representing individual characteristics and situational factors; it is also pursuing questions concerning the extent to which certain criteria, such as illness rates and injury rates, can be predicted by combinations of individual, situational, and organizational variables.

At another level in this research the organization (ship) will be treated as the unit of analysis. Organizational differences in environmental conditions (habitability), crew composition, leader behavior, organizational climate, operational schedules, and other aspects of overall functioning will be related to illness and accident rates, disciplinary actions, reenlistment rates, and evaluations of organizational efficiency.

A preliminary factor analysis of the Habitability Questionnaire in the pilot study identified ten item composites reflecting significant aspects of

perceived habitability on ships. These are: (1) crowding, (2) conditions of sanitary facilities (heads), (3) work area conditions, (4) ship size and congestion, (5) storage space, (6) color, (7) overall temperature and ventilation of the ship, (8) food and messing conditions, (9) lighting, and (10) condition of berthing areas, especially cleanliness and odor. Individual scores for the ten factors of perceived habitability were computed and entered into a multiple discriminant analysis by type of ship. Two discriminant functions were obtained which proved useful for classifying ships in terms of living and working conditions and for identifying salient differences in habitability dimensions that distinguish the minesweepers, the destroyers, and the aircraft carrier (9).

Among the results noted in the pilot study were significant differences in perceived organizational climate among the three types of ships (10). Profiles of scores on five factors of organizational climate -- friendliness and warmth of the work environment, job identification, leadership effectiveness, group homogeneity, and job standards and demands -- were found to be related to differences in ships in relation to their location (overseas vs. continental U.S.), illness rates, and performance indices. A pattern of organizational climate was found which was associated with the tendency of ships' crews to have relatively high illness, accident, and disciplinary rates and a relatively low rate of intention to reenlist.

The major study, now well under way, provides a comprehensive set of variables supported by standardized measurement scales and should contribute useful information concerning the relative importance of the physical environment, organizational factors, and individual characteristics as they affect health, job satisfaction, and work effectiveness in naval organizations.

Comparison of results from selected civilian organizations should contribute to general theoretical formulations concerning relationships of individual characteristics and situational variables to individual and organizational effectiveness.



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#### Footnotes

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\*\*Head, Epidemiology and Operational Psychiatry Division, Navy Medical Neuropsychiatric Research Unit, San Diego, California 92152.

\*\*\*Director, Institute of Behavioral Research, Texas Christian University, Fort Worth, Texas.

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perceived habitability dimensions and organizational climate dimensions which differentiate among three types of ships. The major study now in progress provides a comprehensive set of descriptors of naval organizations and related these variables to health, job satisfaction, and individual and group effectiveness.

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